OIPE IAP9 AUG 23 2006 PATENT & TRADEMARK OFFICE

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HDP/SB/21 based on PTO/SB/21 (08-00)

AFC (IPW)

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/620,053
Filing Date	July 20, 2000
Inventor(s)	Yang CAO
Group Art Unit	2616
Examiner Name	Ian N. Moore
Attorney Docket Number	129250-000971/US

ENCLOSURES *(check all that apply)*

- ☒ Fee Transmittal Form
  - ☒ Fee Attached
- ☐ Amendment
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
- ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Assignment Papers *(for an Application)*
- ☐ Letter to the Official Draftsperson and ____ Sheets of Formal Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) ____
- ☐ After Allowance Communication to Group
- ☐ LETTER SUBMITTING APPEAL BRIEF AND APPEAL BRIEF (w/clean version of pending claims)
- ☒ Appeal Communication to Group (***Notice of Appeal***, *Brief, Reply Brief*)
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) *(please identify below)*:

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Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	CAPITOL PATENT & TRADEMARK LAW Firm, PLLC	Attorney Name: John E. Curtin	Reg. No.: 37,602
Signature			
Date	August 23, 2006		

OIPE IAP80 AUG 23 2006 PATENT & TRADEMARK OFFICE

PTO/SB/17 (12-04)
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FEE TRANSMITTAL for FY 2006

Effective 10/01/2004. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 500.00

Complete if Known	
Application Number	09/620,053
Filing Date	July 20, 2000
First Named Inventor	Yang Cao
Examiner Name	Ian N. Moore
Art Unit	2616
Attorney Docket No.	129250-000971/US

METHOD OF PAYMENT *(check all that apply)*

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1011	300	2011	150	Utility filing fee	
1012	200	2012	100	Design filing fee	
1013	200	2013	100	Plant filing fee	
1014	300	2014	150	Reissue filing fee	
1005	200	2005	100	Provisional filing fee	

SUBTOTAL (1) ($) 0

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

			Extra Claims		Fee from below		Fee Paid
Total Claims		-20 **	9 prev. paid for	X		=	0
Independent Claims		-3 **	4 prev. paid for	X		=	0
Multiple Dependent						=	0

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	50	2202	25	Claims in excess of 20
1201	200	2201	100	Independent claims in excess of 3
1203	360	2203	180	Multiple dependent claim, if not paid
1204	200	2204	100	** Reissue independent claims over original patent
1205	50	2205	25	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	120	2251	60	Extension for reply within first month	
1252	450	2252	225	Extension for reply within second month	
1253	1020	2253	510	Extension for reply within third month	
1254	1,590	2254	795	Extension for reply within fourth month	
1255	2,160	2255	1080	Extension for reply within fifth month	
1401	500	2401	250	Notice of Appeal	500
1402	500	2402	250	Filing a brief in support of an appeal	
1403	1000	2403	500	Request for oral hearing	
1452	500	2452	250	Petition to revive – unavoidable	
1453	1500	2453	750	Petition to revive – unintentional	
1501	1400	2501	700	Utility issue fee (or reissue)	
1502	800	2502	400	Design issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	790	2809	395	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	790	2810	395	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	790	2801	395	Request for Continued Examination (RCE)	
				Other fee (specify) ____	

*Reduced by Basic Filing Fee Paid SUBTOTAL (3) ($)500

4. SEARCH/EXAMINATION FEES

1111	500	2111	250	Utility Search Fee	
1112	100	2112	50	Design Search Fee	
1113	300	2113	150	Plant Search Fee	
1114	500	2114	250	Reissue Search Fee	
1311	200	2311	100	Utility Examination Fee	
1312	130	2312	65	Design Examination Fee	
1313	160	2313	80	Plant Examination Fee	
1314	600	2314	300	Reissue Examination Fee	

SUBTOTAL (4) ($)0

SUBMITTED BY					Complete *(if applicable)*
Name (Print/Type)	John E. Curtin	*Registration No. (Attorney/Agent)*	37,602	*Telephone*	(703) 266-3330
Signature				*Date*	August 23, 2006

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OIPE IAP90 AUG 23 2006 PATENT & TRADEMARK OFFICE

IN THE U.S. PATENT AND TRADEMARK OFFICE

Appellant:	Yang CAO
Application No.:	09/620,053
Art Unit:	2616
Filed:	July 20, 2000
Examiner:	Ian N. Moore
For:	APPARATUS AND METHOD FOR SYNCHRONOUS AND ASYNCHRONOUS SWITCHING OF INTERNET PROTOCOL TRAFFIC
Attorney Docket No.:	129250-00971/US

APPELLANT'S BRIEF ON APPEAL

MAIL STOP APPEAL BRIEF - PATENTS
Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

August 23, 2006

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1AP90

APPELLANT'S BRIEF ON APPEAL

I. REAL PARTY IN INTEREST:

The real party in interest in this appeal is Lucent Technologies Inc. Assignment of the application was submitted to the U.S. Patent and Trademark Office on July 20, 2000, and recorded at Reel 011018, Frame 0738.

II. RELATED APPEALS AND INTERFERENCES:

There are no known appeals or interferences that will affect, be directly affected by, or have a bearing on the Board's decision in this Appeal.

III. EVIDENCE SUBMITTED UNDER 37 CFR 1.130, 1.131, OR 1.132

None.

IV. DECISIONS RENDERED BY A COURT OR THE BOARD IN RELATED APPEALS AND INTERFERENCES

None.

V. STATUS OF CLAIMS:

Claims 1-42 are pending in the application, with claims 1, 12, 28 and 33 being written in independent form.

Claims 11, 24, 32 and 39 were objected to, the Examiner stating the subject matter of these claims would be allowable if rewritten to include the features of their base independent claim and any intervening claims. Claims 1, 4, 12, 15, 28 and 33 were finally rejected based on obviousness-type double patenting. Further, claims 1-10, 12-23, 25-31, 33-38 and 40-42 remain finally rejected under 35 U.S.C. §103(a). Claims 1-42 are being appealed.

VI. STATUS OF AMENDMENTS:

A Request for Reconsideration ("Request") was filed on May 22, 2006. In an Advisory Action dated June 6, 2006 ("Advisory") the Examiner stated that the Request was considered and any amendments entered, but the request did not place the application in condition for allowance.

VII. SUMMARY OF CLAIMED SUBJECT MATTER:

(i.) Overview of the Subject Matter of the Independent Claims

The invention relates to telecommunications systems and, more particularly, to the efficient switching of Internet Protocol (IP) traffic using circuit and packet switched fabrics, the packet switched fabrics including IP router switch fabrics and asynchronous transfer mode (ATM) switch fabrics.

In accordance with the principles of the present invention a hybrid switch includes packet and circuit switching switch fabrics, a controller, which may be referred to hereinafter as a hybrid switch resource manager, and one or more input/output ports (I/O port). Telecommunications traffic enters the switch and, after the traffic is switched, departs to telecommunications network through the 1/0 port(s). A new connection admission control (CAC) process is employed by the controller to route Internet Protocol (IP) traffic to either a circuit switch fabric, such as an STM switch fabric, or to packet switch fabric, such as an IP switch fabric. Because the traffic load is shared, in parallel fashion, between the circuit and packet fabrics, neither switch need be of sufficient magnitude to accommodate the entire traffic load (specification, pages 4-5).

In an illustrative embodiment the hybrid switch's controller maps IP traffic into an appropriate ATM service category. IP traffic that is mapped into an ATM service category, such as CBR or rt-VBR, is aggregated "on-the-fly" and switched through the hybrid switch's circuit switched switch fabric. IP traffic that is mapped into another ATM service category is directed to a packet switch

fabric for switching in that fabric. As a result, a hybrid switch in accordance with the principles of the present invention provides efficient use of circuit and packet switch fabrics, the overall bandwidth of the switch, and buffers used for access to the switch.

In accordance with the principles of the present invention all IP traffic that is mapped into an ATM CBR service category may be aggregated and switched through a circuit switch fabric. IP traffic that is mapped into ATM rt-VBR service category may be switched through a packet switch fabric in a conventional manner or it may be switched in the same fashion as ATM CBR traffic. IP traffic mapped into other categories may be switched through the hybrid switch's packet switch fabric (specification, page 5).

(ii.) Additional Text from the Specification in Support of the Claims

Attempts have been made to address quality of service issues that arise, for example, when time-sensitive traffic, such as voice traffic, is transmitted over an internet protocol (IP) network. Since IP was directed, after all, primarily toward the transmission of data, "best effort" transmission was judged to provide sufficient quality for IP transmission and, generally, quality of service was not addressed. However, with the confluence of real-time and non-real-time traffic on networks that may include both circuit and packet switching facilities, conventional approaches to accommodating traffic having varied quality of service requirements under-utilize resources or fail to meet quality of service requirements. Although quality of service categories are available for asynchronous transfer mode (ATM) traffic, the various quality of service categories supported by ATM, and the concomitant varied requirements, exacerbate the difficulty of modeling an ATM compatible switching system. Consequently, many conventional ATM systems either employ conservative systems modeling, which results in underutilized facilities such as bandwidth and/or buffers, or aggressive modeling, which degrade system performance. A system and method that enable the efficient combination

and management of circuit-switched and packet-switched facilities, thereby taking advantage of the tremendous installed base of equipment and facilities while, at the same time, permitting an extensive upgrade of data facilities, which typically employ packet switching systems, would prove advantageous. In particular, a system and method that provides such advantages for IP traffic would be highly desirable (specification, pages 3-4).

The new hybrid switches provided by the present invention may be connected in any of a variety of network topologies. For ease and clarity of description, the illustrative embodiment of Figure 1 (Appendix B) includes six hybrid switches in accordance with the principles of the invention (Node A, Node B, Node C, Node D, Node E and Node F) that are connected in a ring 100, in which Nodes A and B are connected through a link 102, Nodes B and C are connected through a link 104, Nodes C and D are connected through a link 106, Nodes D and E are connected through a link 108, Nodes E and F are connected through a link 110, and Nodes F and A are connected through a link 112. As described in greater detail in the discussion related to Figures 2 (Appendix C) and 3 (Appendix D), each of the hybrid switches (any of the nodes Node A through Node F) includes circuit switch facilities, such as STM switch fabric facilities, packet switch facilities, such as IP switch fabric facilities, Input/Output facilities and a switch manager that, in accordance with principles of the invention, examines incoming traffic and route the traffic to an appropriate switching facility within the hybrid switch. As previously noted, the invention may apply to other network topologies, such as meshes (wherein the nodes A through F may be connected through links 114, 116, 118, 120, 122, and 124, for example). Additionally, within the context of a ring topology, each of the nodes may be connected to a plurality of rings. The illustrative embodiment of Figure 1 was chosen for clarity and simplicity of explanation. Furthermore, although the invention will be discussed in the context of employing a SONET/SDH physical link media, the invention may be used in

conjunction with networks that employ other physical media (specification, pages 6-7).

Each of the Nodes A through F of Figure 1 includes components such as illustrated in the conceptual block diagram of Figure 2. The node 200 includes a controller 202, also referred to herein as a hybrid resource manager 202, a central circuit switch fabric 204, a central packet switch fabric 232, and a plurality of STM units 206, 208, 210, and 212. The hybrid resource manager 202 operates to manage the switch resources through respective communications links 214, 216, 218, 220, and 222 to shelf controllers 224, 226, 228, 230, and a central packet switch fabric 232. The central packet switch fabric in this illustrative embodiment is an asynchronous transfer mode (ATM) switch fabric. The STM units 206, 208, 210 and 212 respectively include input/output (110) interfaces 234, 236, 238, and 240, local switch fabrics, 242, 244, 246, and 248, and switch interfaces, 250, 252, 254, and 256. An I/0 interface, such as I/0 interface 234 may provide a connection, to another network element, or node, through a link such as the link 102 which connects nodes A and B of Figure 1. Traffic arriving at one of the I/0 interfaces is routed under control of the hybrid resource manager 202 by a shelf controller, which more directly controls the operation of a local STM switch. Each of the local STM switches may be, for example, an STS-1 level cross-connect. The capacity of the cross-connect may be related to the I/0 capacity of the corresponding 1/0 interface. That traffic which is routed to the central packet switch fabric 232 may be directed through a switch interface, such as SWIF 250, embodied as an advanced "UTOPIA" interface which is capable of transferring both ATM cells and packet-based traffic (specification, pages 7-8).

As described in greater detail in the discussion related to Figures 2, 3 (Appendix D), 4 (Appendix E) and 5 (Appendix F), the hybrid resource manager partitions incoming traffic into streams that are to be switched either by an STM switch fabric or an IP switch fabric. The STM traffic may be switched in a local STM switch, such as local STM switch 242, for example, or it may be switched

through a central STM switch fabric 204 (optional). Typically, a single ring SONET/SDH embodiment would require only one STM unit, such as the unit 206, to provide an interface to the ring and to provide the STM switching function. A multi-ring or mesh connection would include a plurality of the STM units, as illustrated. In such as case, the STM switching may be provided by a central STM switch fabric 204 which could direct traffic into and out of any of the 1/0 interfaces and to the packet switch fabric 232, as needed. Alternatively, traffic entering one STM unit could be packetized and switched through the central packet switch fabric 232 to travel between I/0 interface 234 and I/0 interface 240, for example. Each of the 1/0 interfaces, such as I/0 234, acts as a ring, or line, interface. IP traffic is first mapped into an ATM service category, then switched. The resource manager may perform the IP-to-ATM mapping process, for example. After thus mapping IP into ATM traffic categories; the hybrid resource manager 202 communicates with the next node in a path of which it is a part and determines, "on the fly", which switch fabric, such as a local STM 242, central packet 232 or central circuit 204, will be employed to switch traffic associated with the IP traffic. This decision is based upon the ATM service category into which the IP traffic has been mapped.

An overview of the process by which a hybrid switch services IP traffic in accordance with the principles of the present invention is provided by the flow chart of Figure 3. The process begins in step 300 and proceeds from there to step 302, where various types of IP traffic is mapped into ATM service categories. This mapping process may take place "offline", with the mappings downloaded to the hybrid switch's resource manager or the resource manager may perform the mapping "on the fly", in which case, the mappings maybe changed to accommodate various requirements (specification, page 8-9).

The IP-to-ATM mapping allows the hybrid switch to employ it's connection admission control CAC process to provide access to its switching facilities in much the same way that it would provide access to ATM traffic. As described in

greater detail below, the IP traffic is routed to either an STM or an IP switch fabric within the hybrid switch, depending upon which ATM service category the IP traffic has been mapped into. Although there are a variety of IP reservation protocols, such as resource reservation setup protocol (RSVP), or constraint based routing label distribution protocol (CRLDP), they all contain a traffic description that describes the characteristics of the IP packet flow. A hybrid switch in accordance with the principles of the present invention employs these IP packet flow descriptions as an interface to the CAC process. Although the following illustrative example will be employ details of an RSVP protocol for illustrative purposes, as will be obvious to one skilled in the art, the new hybrid switch may be operated in conjunction with a wide variety of IP reservation protocols, including CRLDP with multi-protocol label switching (MPLS).

An IP signaling protocol, such as RSVP operates as the IP counterpart to the ATM in-band signaling protocol employed to reserve resources within each node along a path through which traffic is to follow. That is, such protocols are employed to reserve resources along the projected path of the IP traffic, just as ATM in-band protocols are employed to reserve resources for ATM traffic prior to carrying the traffic. An IP signaling protocol message, such as an IP RSVP message, will include information that the new hybrid switch may employ to provide IP traffic with a desired quality of service. An IP RSVP message, "Adspec", for example, is transmitted by a sending node to inform receiving nodes of the characteristics of the desired end-to-end communications path. This information is used by the receivers to determine the level of reservation required in order to achieve the desired end to end QoS.

Service categories available to IP traffic include, Guaranteed Service (GS), Controlled Load Service (CLS), and Best Effort (BE). Each of these IP traffic categories may be mapped into an ATM service category, such as CBR, rt-VBR, nrt-VBR, UBR, or ABR. Various mapping procedures are possible and discussed for example in, M. Garrett, M. Borden, Interoperation of Controlled-Load Service

and Guaranteed Service with ATM, ftp://ftp.isi.edu/in-notes/rfc2381.txt, which is hereby incorporated by reference (specification, pages 9-10).

An Adspec IP reservation message includes a message header, a Default General Parameters fragment and at least one of the following: Guaranteed Service fragment or Controlled-Load Service fragment. The Default General Parameters fragment includes fields which are updated at each RSVP-capable router along the path in order to present end-to-end values to the receivers. These fields include, Minimum Path Latency, Path Bandwidth, Global Break bit, and Path MTU. The Minimum Path Latency (summation of individual link latencies). represents the end-to-end latency in the absence of any queuing delay. In the case of Guaranteed Service, receivers can add this value to the bounded end-to-end queuing delay to obtain the overall bounded end-to-end delay. The Path Bandwidth is the minimum of individual link bandwidths along the path. The Global Break bit: is cleared when the Adspec is created by the sender. Encountering any routers that do not support RSVP will result in this bit being set to one. And, the Path MTU is the minimum of Maximum Transmission Units of individual links along the path.

For Guaranteed Service, the source Tspec contains peak rate, token bucket rate and bucket depth parameters: p_s, r_s and b_s. The receiver Tspec contains corresponding parameters p_r, r_r and b_r. The receiver Rspec also has a rate R which denote the bandwidth reserved by this receiver. For Controlled Load Service, the source Tspec contains peak rate, token bucket rate and bucket depth parameters: p_s, r_s and b_s. The receiver Tspec contains corresponding parameters p_r, r_r and b_r. The receiver Rspec also has a rate R which denote the bandwidth reserved by this receiver (specification, pages 10-11).

If, for example, IP Guaranteed Service is mapped into the ATM rt-VBR service category, the ATM traffic descriptor parameters (PCR, SCR, MBS) may be set as follows:

PCR = p_r

SCR = r_r

MBS = b_r

Or, if IP Guaranteed Service is mapped into the ATM CBR service category, the value of the ATM PCR may be mapped to the Rspecrate r_r if the edge device has sufficient buffer. With little or no burst buffering, PCR = max (r_r, p_r).

IP Controlled Load Service may be mapped into the ATM rt-VBR service category, in which case the ATM traffic descriptor parameters (PCR, SCR, MBS) may be set as follows:

PCR= p _r

SCR = r_r

MBS = b_r

Or, if IP Controlled Load Service is mapped into the ATM ABR service category, the minimal packet rate (MPR) parameter of ABR is set as r_r. For Best Effort service there is no traffic description, so it is mapped into ATM LIBR service class.

After mapping IP services into ATM service categories, the process proceeds from step 302 to step 304 where IP traffic is received. From step 304 the process proceeds to step 306 where the arriving IP traffic's ATM "equivalent' category is determined. From step 306 the process proceeds to step 308, where the hybrid switch's CAC is employed to establish a traffic path in a manner set forth in greater detail in the discussions related to Figures 4, 5, and 6 (Appendix G). From step 308, the process proceeds to end in step 310 (specification, page 11).

For each inter-connecting link, such as link 102 between nodes A and B, the total bandwidth of the link is partitioned into a plurality of units and these units are allocated to STM or ATM traffic. If the packet switch fabric 232 supports a UTOPIA-11 interface, the basic unit is an STS-1. If the switch fabric 232 supports a UTOPIA-111 interface, the unit is an STS-3C. For example, if the link 102 is an OC192 link, and the switch fabric supports UTOPIA-III, the link is partitioned into

64 OC-3C based units. For each unit, there is one entry in an ingress and egress resource table, as follows:

Ingress Resource Table:

Tributary No.	Free Flag	Destination Address	Available Bandwidth	Status: Drop/Pass

TABLE 1

Egress Resource Table:

Tributary No.	Free Flag	Destination Address	Available Bandwidth	Status: Drop/Pass

TABLE 2

The destination Address is either based on the IP address for this node or the proprietary address. For each ingress link, there is one ingress resource table associated with it. Correspondingly, there is one egress resource table for each egress link. It is assumed that there is at least one entry in each link's resource table (specification, pages 11-12).

At initialization time, all the free flags are initialized to have the value 0, indicating that the link is free. The available Bandwidth entry takes the initial value of the link's total physical transmission bandwidth, the Destination Address is initialized as 0, and Status is initialized as either Add (egress link) or Drop (ingress link).

At run time the various tributaries' resources may be allocated for different traffic categories with the allocations reflected in the ingress and egress resource tables. For example, resources may be allocated to CBR traffic from tributaries, starting with a top tributary number and working the way down, while other

service categories may be allocated resources from the bottom up. Assume, for example that an egress link is an OC192 link. The link may be partitioned into 64 OC3 tributaries, in which case the link's associated egress table would have 64 entries, one for each tributary (also referred to herein as link traffic units). As traffic requests are received at the node (hybrid switch), resources are allocated, as set forth in greater detail in the discussion related to Figure 4, to service the traffic. An source payload envelope (SPE) mapper may be configured to encapsulate a specific number of channels on the egress link. For example, two OC3C channels provisioned as non-path terminated at the next node, and an OC192 that is provisioned as path terminated at the next node. Additionally, the STS point processor of the inbound OC192 link on the next node would be configured to recognize and process these channels, again, as set forth in greater detail in the discussion related to Figure 4. Traffic received at the "next" node will be processed first by the STS pointer processor in the nodes' I/0 shelf, the two OC3C channels may then be served directly by a local STS crossconnect, thus avoiding the necessity of further processing though the UTOPIA interface. The OC192 channel may be sent directly to a centralized IP switch for further processing through a UTOPIA interface (specification, pages 12-13).

A number of ATM service categories, with their attendant quality of service requirements, have been defined and are listed in table 3:

Service Category	QoS
CBR	PLR ≤ ε PDV ≤ δ MaxPTD ≤ γ
rt-VBR	PLR ≤ ε PDV ≤ δ MaxPTD ≤ γ
nrt-VBR	PLR ≤ ε
UBR	Best Effort
ABR	PLR ≤ ε

TABLE 3

Where:

PLR =packet loss rate

PDV= packet delay variation

MaxPTD = maximum end-to-end packet transfer delay and s, S and y are the corresponding system requirements.

In accordance with the principles of the present invention, traffic falling within the CBR and rt-VBR categories may be treated as "real-time" and switched through a hybrid switch's STM switch fabric. Each incoming ATM connection request is passed to the hybrid resource manager 202 which determines how the traffic is to be switched. In accordance with the principles of the present invention, specific types of ATM requests indicate that the associated ATM traffic is to be switched through a STM switch fabric within the hybrid switch. In this illustrative embodiment, all CBR type ATM traffic is routed by the hybrid resource manager 202 to an STM switch fabric (specification, pages 12-14).

An overview of the process by which the resource manager 202 handles ATM connection requests will be provided in a discussion related to the conceptual block diagram of a three-Node telecommunications system of Figure 4. Each of the

nodes, G through 1, is a hybrid telecommunications switch in accordance with the principles of the present invention. Assuming that CBR type ATM traffic originates at Node G and has a destination of Node I STM bandwidth that has already been provisioned for ATM traffic within each of the nodes, and other resources, such as buffer space, is dynamically allocated to the CBR request. For example an ATM request originating at Node G with a destination of Node I would be passed along to Node I and with each subsequent node along the path examining its routing table, as well as the availability of buffers and ingress and egress bandwidth.

Each node's hybrid resource manger could perform this operation. Each node in the path determines whether it has the available resources, whether for pass-through or destination operations, depending upon whether it's routing table indicates it is the destination node or not. If each node within the path has the available capacity (for example, ingress and egress bandwidth and buffers), the destination node affirms the ATM request and this affirmation is returned, node to node, to the ingress node (Node G in this example). In this way, resources, including STM switch fabrics within each node, ate dynamically provisioned for CBR type ATM traffic in the illustrative network.

The flowchart of Figure 5 illustrates in greater detail the process by which the resource manager 202, through connection admission control, determines the manner in which ATM traffic is to be switched, should the incoming service request indicate that the traffic is CBR traffic. The process begins in step 500, where the resource manager 202 determines that a received connection request is a CBR request. In this illustrative embodiment, all CBR type ATM requests are routed to a STM switch fabric for switching. The process then proceeds to step 502, where the resource manager 202 determines whether the ATM connection request is an "original" CBR request. That is, the resource manger 202 determines whether the node receiving the request, the node associated with the resource manager, is the first node to receive the request, or the request is a pass-through request. If the

request is not an original request, the process branches to step 504, which step will be described below (specification, pages 14-15).

If the request is an "original" request, the process proceeds to step 506, where the resource manager determines whether the switch has sufficient ingress bandwidth to service the request. If there is not sufficient bandwidth for the request, the resource manager denies the request in step 508 and the process proceeds to end in step 510. Bandwidth may be provisioned for different ATM service categories in a variety of ways. For example, all link traffic units, such as OC-3C traffic units, as previously discussed, may initially be "free", and their availability would be reflected by a "0" entry in a corresponding ingress resource table. In response to a connection request having a speed service type, the resource manager determines whether the allocated bandwidth for the specific service category is sufficient for the request and, if bandwidth is available, the resource manager incrementally allocates the bandwidth for the service category. After allocating the bandwidth, the resource manager alters the resource table to reflect the allocation by changing the corresponding "Free Flag" from "0" to "1." Consequently, the resource manager may attempt to allocate the necessary ingress bandwidth, "on the fly" as the request is received and only deny the request if the bandwidth cannot be allocated in the manner just described.

If there is sufficient ingress bandwidth, the process proceeds to step 512 where the resource manager employs the node's routing tables, as previously described in the discussion related to Figure 4, to determine whether the node is the final destination for the related CBR traffic. If the node is the final destination, the process proceeds to step 514 where the resource allocation state is updated, that is, the resource availability information in the resource allocation table is modified to reflect changes, and a request acceptance is returned. From step 514 the process proceeds to end in step 510. If, on the other hand, the node is not the final destination for the CBR traffic, the process proceeds from step 512 to step 516. In step 516, based upon information contained within the CBR request, the

next node and corresponding egress link are computed and the egress link's resource table is located. The process then proceeds to step 518, where the resource manager examines the egress link's corresponding egress resource table. If resources have not yet been allocated for CBR traffic to the destination address, the egress resource table for the link will not have an entry for that address. Therefore, if the resource manager determines that there is no entry within the resource table for the destination address, the, process proceeds to step 524, which will be described after step 522 (specification, pages 15-16).

On the other hand, if there is an entry for the destination address, the process proceeds to step 520 where it is determined whether the bandwidth allocated for CBR traffic to the destination address is sufficient for the current request. If there is sufficient bandwidth, the process proceeds to step 522 where the request is accepted, the available bandwidth information is modified to reflect the allocation of bandwidth to the traffic whose request has just been accepted, and the process proceeds to end in step 510. If, in step 520, it is determined that there is insufficient available bandwidth, the process proceeds to step 524. In step 524 the resource manager determines, from the resource table, whether there are "free" resources that may be allocated to CBR traffic for the destination address that are sufficient to handle the CBR request. If there are not, the process proceeds to step 526, where the request is denied, and, from there, to end in step 510. If, on the other hand, it is determined in step 524 that there are sufficient "free" resources to handle the CBR request, the process proceeds to step 528. In step 528, the CBR request is marked as a "passthrough" request and sent to the next node, which may or may not be the destination node. The resource manager then awaits a reply from the next node indicating whether the remaining node(s) in the path, including the egress node, accept the CBR request.

If the response from the remaining nodes is a request rejection, or timeout, the process proceeds to step 526 and from there as previously described. If the response is an acceptance from the other nodes, the process proceeds to step

532, where the resource manager accepts the CBR request. Additionally, the resource manager updates the egress resource table entry by setting the Free Flag to "1 ", sets the destination address entry as the destination address of the CBR request, modifies the available bandwidth entry by subtracting the bandwidth require for the CBR traffic request just accepted and sets the status as "Add". The CBR bandwidth that is subtracted from the table's available bandwidth entry is indicated by the PCR parameter of the CBR service request. From step 532 the process proceeds to end in step 510 (specification, pages 16-17).

Returning to step 504, the resource manager determines whether the resource table indicates that resources are free to service the incoming CBR traffic and, if not, the process proceeds to step 534 where the node rejects the request and, from there, to end instep 510. If the resource entry indicates there are resources available for the requesting traffic, the process proceeds to step 536, where the resource manager determines whether the node is the destination of the CBR connection. If the node is the destination node the process proceeds to step 538, where the tributary, such as an OC3c, is provisioned as a path termination tributary, the Free Flag of the corresponding ingress resource table is set to "1" and the status is updated to "Drop", indicating that this node is the destination, or "drop" node for the corresponding traffic. The resource manager also returns an acceptance of the request and the process proceeds to end in step 510.

If the node is not the destination node for the CBR request, the process proceeds from step 536 to step 540 where, based on information contained within the CBR request, the resource manager computes the next node and corresponding egress link. The resource table for the egress link is then examined to determine whether there is a "free" resource entry. If the resource entry is not "Free", the process proceeds to step 542, where the node rejects the CBR request and, from there, to end in step 510. If the resource table entry indicates that the unit's resources are "Free" the process proceeds from step 540

to step 544 where the CBR request is forwarded to the next node and the resource manager awaits a response. When a response is received, the process proceeds to step 546 where, if the response from a downstream node is negative, the process proceeds to step 548 where the resource manager passes this rejection back to the requesting party. From step 548, the process proceeds to end in step 510. If the response from the downstream nodes were affirmative, the resource manager provisions the ingress and egress tributaries as pass-through, returns an acceptance to the requesting party and updates the ingress and egress resource tables to indicate that the status is "Pass", and the Free Flag is set equal to "I". From step 550, the process proceeds to end in step 510 (specification, pages 17-18).

The flowchart of Figure 5 illustrates in greater detail the process by which the resource manager 202, through connection admission control, determines the manner in which ATM traffic is to be switched, should the incoming service request indicate that the traffic is rt-VBR traffic. In one aspect of the invention, the resource manager may be instructed to route all rt VBR requests to either an STM switch or an IP switch, at the option of a service provider, for example. Otherwise, the resource manager 202 may determine whether rt-VBR traffic should be served through a circuit path (that is, through an STM switch fabric within the hybrid switch). This determination may be based on an internal system parameter 0, a packet rate ratio threshold, as follows:

employ an STM switch for rt-VBR traffic if $PPR/SPR \leq \phi$

where:

PPR = peak packet rate

SPR = sustained packet rate

ϕ = packet rate ratio threshold

If the rt-VBR traffic is served by an IP switch, the effective bandwidth required for the request may be computed on the request's associated service

contract. The service contract will typically include quality of service requirements, such as delay, packet loss ratio, and the nature of the traffic, which might include, average rate, peak rate, and burst period (specification, pages 18-19).

Requests for rt-VBR traffic may be handled as described in relation to the flow chart of Figure 6, in which the process begins in step 600. In step 600 it is assumed that the traffic request has already been determined to be an rt-VBR request. The process proceeds to step 601, where the resource manager determines whether a service provider has elected to switch all rt-VBR traffic in the same manner as CBR traffic. This election may be evidenced by a flag that has been set, for example. If the service provider has elected to treat all rt-VBR traffic as CBR traffic, that is, in the manner described in the discussion related to Figure 5, the process proceeds to step 604, where the procedures set forth in the discussion related to Figure 5 are employed to switch the traffic. If the service provider has not elected in this manner to treat all rt-VBR traffic as CBR traffic, the process proceeds to step 602, where the resource manager determines whether the rt-VBR traffic is to be switched in a conventional ATM switching manner, such as a linear approximation ATM switching process, or it is to be switched in the same manner as CBR traffic. The resource manager may make this determination using the peak-to-sustained packet rate ratio, opting to switch vt-VBR traffic in the same manner as CBR traffic if the ratio is less than a predetermined threshold value, for example.

If the rt-VBR traffic is to be switched as CBR traffic, that is, in the manner described in the discussion related to Figure 5, the process proceeds to step 604, where the procedures set forth in the discussion related to Figure 5 are employed to switch the traffic. After switching the traffic in this manner, the process proceeds to end in step 606. If, in step 602, the resource manager 202 determines that vt-VBR traffic is to be switched using conventional ATM switching techniques, the process proceeds to step 608, where the switching takes place. From step 608, the process proceeds to end in step 606. IP traffic that has been mapped into other ATM

service categories may be switched using conventional ATM switching techniques (specification, pages 19-20).

Appellant respectfully notes that the above summary of the invention, including any indication of reference numerals, drawings, figures, paragraphs, page numbers, etc. (collectively referred to as "descriptions" of the application) have been provided solely to comply with the U.S. Patent and Trademark Office's rules concerning the appeal of the claims of the present application. As such, the descriptions above are merely exemplary and should not be construed to limit the claims of the present application in any way whatsoever.

VIII. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL:

Appellant seeks the Board's review and reversal of the Examiner's rejection of claims 1, 4, 12, 15, 28 and 33 based on obviousness-type double patenting and claims 1-10, 12-23, 25-31, 33-38 and 40-42 under 35 U.S.C. §103(a).

IX. ARGUMENTS:

A. The Rejections

Claims 1, 4, 12, 15, 28 and 33 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 16, 28 and 35 of U.S. Patent No. 6,865,179 (the " '179 Patent") in view of U.S. Patent No. 6,330,239 to Suzuki ("Suzuki").

Claims 1 and 12 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,920,412 to Chang ("Chang '412") in view of U.S. Patent No. 6,657,757 to Chang et. al. ("Chang '757"). Further, the following additional rejections were made based on 35 U.S.C. 103(a) using a combination of Chang '412 and Chang '757 with additional references:

(i) claims 2, 3, 7, 13, 14, 28 and 33 based on Chang '412, Chang '757 and further in view of U.S. Patent No. 5,570,355 to Dail et. al ('Dail");

(ii) claims 4-6 and 15-17 based on Chang '412, Chang '757, Dail and yet further in view of U.S. Patent No. 6,574,224 to Brueckheimer ('Brueckheimer");

(iii) claims 8, 19, 29 and 34 based on Chang '412, Chang '757, Dail and yet further in view of U.S. Patent No. 5,982,771 to Caldara ("Caldara");

(iv) claims 9, 20-22, 25-27, 30, 35-37 and 40-42 based on Chang '412, Chang '757, Dail and yet further in view of U.S. Patent No. 5,832,197 to Houji ("Houji"); and

(v) claims 10, 23, 31 and 38 based on Chang '412, Chang '757, Dail Houji and Brueckheimer.

Applicants respectfully disagree for at least the following reasons.

B. The Double Patenting rejections

(i) Claims 1, 4, 12, 15, 28 and 33 are not the same scope as claims in the '179 Patent

To satisfy an obviousness-type double-patenting rejection the Examiner must demonstrate that rejected claims 1, 4, 12, 5, 28 and 33 are of the "same scope" as claims 1, 16, 28 and 35 in the '179 Patent. On their face the claims of the instant application and those of the '179 patent are not of the same scope. The instant claims are directed at *IP traffic* routing while those of the '179 Patent are directed at *ATM traffic* routing. Further, the instant claims include the feature of routing IP traffic *based on an ATM service category of the IP traffic.*

In the Final Office Action the Examiner appears to take the position that the scope of the rejected claims in the instant application are the same scope as claims in the '179 Patent because the words IP traffic in the claims can be replaced with the words ATM traffic from the claims in the '179 Patent. (see page 2, paragraph 2: "....routing IP traffic over ATM traffic [sic] or replacing

ATM traffic with IP traffic is well known in the art...". Further, in the Advisory the Examiner states that the Appellant is "only arguing the words rather than the functionality associated with these words".

Rather than just "argue the words" (to paraphrase the Examiner) the Appellants have previously pointed out that ATM may be used to transmit information that may be formatted in any number of ways, not just IP. Thus, Appellant's believe their position is justified at this time.

(ii) Suzuki does not disclose or suggest the routing of IP formatted traffic using ATM service categories

Turning now to the rejection of claims 1, 4, 12, 15, 28 and 33 based on a combination of the '179 Patent and Suzuki, each of these claims recites, among other things, that IP traffic is routed to a circuit switch fabric or packet switch fabric depending on an ATM service category of the IP traffic.

Rather than disclose or suggest the routing of IP traffic based on ATM service categories, Suzuki appears to just disclose the known encapsulation of IP traffic and the use of an ATM transmission scheme. Again, while it may be true that encapsulating IP traffic within ATM was known by those skilled in the art, what was unknown until the advent of Appellant's invention was the routing of IP traffic to one of two different switch fabrics based on ATM service levels, a feature that is not disclosed in, nor suggested by, Suzuki. The Appellants respectfully submit that the Examiner appears to be minimizing the feature of the use of ATM service categories to route IP traffic.

Accordingly, Appellant respectfully requests that the members of the Board reverse the decision of the Examiner and allow claims 1, 4, 12, 15, 28 and 33.

C. The Claims Are Patentable Over Chang '412 And The Other References.

(i) The Deficiencies of Chang '412

Applicant respectfully submits that Chang '412 fails to teach or suggest: (i) the routing of IP traffic based on an ATM service category; (ii) at least one circuit switch and packet switch fabric making up a (iii) hybrid telecommunications switch as recited in claim 1 and similarly recited in claims 12, 28 and 33.

As admitted by the Examiner, Chang '412 is unrelated to IP traffic. Further, Applicant respectfully submits that the "type check 24" disclosed in Chang '412 determines whether an optical signal is an ATM or STM signal without taking into consideration the ATM *service level* of any of the traffic (see Chang '412, column 12, lines 13-14; 32-33; 53-54; and column 15, lines 25-52). In sum, Chang '412 does not disclose the routing of IP traffic based on an ATM service category as recited in claim 1 and similarly recited in claims 12, 28 and 33.

Next, though the Examiner appears to equate the "Optical Network Routing Apparatus (ONRA) 14d" of Chang '412 with the claimed hybrid telecommunications switch, this is inaccurate. The ONRA is a router, not a switch. Chang '412 itself uses the two words router and switch differently (see for example, "ONRA 14d", "ATM switch 10", and "STM Station or Switch 20" in Fig. 4.). In sum, Chang '412 does not disclose a hybrid telecommunications switch as recited in claim 1 and similarly recited in claims 12, 28 and 33.

Last, but not least, the Examiner appears to equate the "STM' and "ATM" add/drop multiplexers (ADMs) 28, 32 of Chang '412 with the claimed circuit switch and packet switch fabrics. This too is inaccurate. An ADM is not a switch as is no doubt realized by the Examiner. Further, Chang '412 itself uses the two words ADM and switch differently (see for example, "STM ADM 28", "ATM ADM 32", "ATM switch 10", and "STM Station or Switch 20" in Fig. 4.). In

sum, Chang '412 does not disclose a hybrid telecommunications switch that comprises a circuit switch fabric and packet switch fabric as recited in claim 1 and similarly recited in claims 12, 28 and 33.

(ii) The Other References Do Not Make Up for The Deficiencies of Chang '412

The Appellants respectfully submit that each of the remaining references does not make up for the deficiencies of Chang '412. Thus, Appellant submits that claims 1-10, 12-23, 25-31, 33-38 and 40-42 are patentable over Chang '412 taken separately, or in combination with any other additional reference(s), for the reasons set forth above.

X. CONCLUSION:

Appellant respectfully requests that the members of the Board reverse the Examiner's decisions rejecting claims 1-42 and allow these claims.

XI. EVIDENCE APPENDIX

None.

XII. RELATED PROCEEDING APPENDIX

None.

The Commissioner is authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 50-3777 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

CAPITOL PATENT & TRADEMARK LAW FIRM, PLLC.

By: _____

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P.O. Box 1995
Vienna, Virginia 22183
(703) 266-3330

CLAIMS APPENDIX

Claims 1-42 on Appeal:

LISTING OF CLAIMS

1. A hybrid telecommunications switch comprising:

at least one circuit switch fabric;

at least one packet switch fabric; and

a controller configured to route IP traffic to the circuit switch fabric or packet switch fabric, depending on an ATM service category of the IP traffic.

2. The switch of claim 1 wherein a portion of the circuit switch fabric resources are provisioned for circuit switched traffic and the remaining portion of the circuit switch fabric resources are allocated to IP traffic as the controller routes IP traffic to the circuit switch fabric.

3. The switch of claim 2 wherein the controller is further configured to allocate circuit switch fabric resources to traffic falling within an ATM service category.

4. The switch of claim 3 wherein the controller is further configured to route IP traffic associated with a constant bit rate (CBR) ATM service category to the circuit switch fabric.

5. The switch of claim 3 wherein the controller is further configured to route IP traffic associated with a real time variable bit rate (rt-VBR) ATM service category to the circuit switch fabric.

6. The switch of claim 3 wherein the controller is further configured to route IP traffic associated with an ATM service category which is neither CBR nor rt-VBR traffic to the IP switch fabric.

7. The switch of claim 3 wherein the controller is further configured to allocate available circuit switch resources, as indicated by a resource table, to received IP traffic requests.

8. The switch of claim 7 wherein the controller is further configured to maintain circuit switch ingress and egress resource tables.

9. The switch of claim 7 wherein the controller is further configured to pass an IP traffic request to a destination node and to establish an IP traffic path after having determined that all nodes along the proposed traffic path have accepted an IP traffic request.

10. The switch of claim 9 wherein the controller is further configured to determine whether IP traffic associated with the rt-VBR ATM service category is to be routed through the circuit switch fabric.

11. The switch of claim 10 wherein the controller is further configured to determine whether IP traffic associated with the rt-VBR ATM service category is to be routed through the circuit switch fabric based upon a peak to sustained packet rate ratio.

12. A method for routing telecommunications traffic in a hybrid telecommunications switch comprising at least one packet switch fabric, at least one circuit switch fabric, and a controller, including the step of:

routing IP traffic to the circuit switch fabric or packet switch fabric, depending on an ATM service category of the IP traffic.

13. The method of claim 12 further comprising the step of:

provisioning a portion of the circuit switch fabric resources for circuit switched traffic, and

allocating the remaining portion of the circuit switch fabric resources to IP traffic as a controller routes the IP traffic to the circuit switch fabric.

14. The method of claim 13 further comprising the step of:

allocating circuit switch fabric resources to IP traffic.

15. The method of claim 13 further comprising the step of:

routing IP traffic associated with a CBR ATM service category to the circuit switch fabric.

16. The method of claim 13 further comprising the step of:

routing IP traffic associated with an rt-VBR ATM service category to the circuit switch fabric.

17. The method of claim 13 further comprising the step of:

routing IP traffic not associated with the CBR or rt-VBR ATM service categories to the IP switch fabric.

18. The method of claim 13 further comprising the step of:

allocating available circuit switch fabric resources, as indicated by a resource table, to IP traffic requests.

19. The method of claim 13 further comprising the step of:

maintaining circuit switch ingress and egress resource tables.

20. The method of claim 13 further comprising the step of:

passing an IP traffic request to a destination node.

21. The method of claim 20 further comprising the step of:

determining that all nodes along the proposed IP traffic path have allocated circuit switch fabric resources for the IP traffic.

22. The method of claim 21 further comprising the step of:

establishing an IP traffic path after the determination step.

23. The method of claim 21 further comprising the step of:

determining whether IP traffic associated with the rt-VBR ATM service category is to be routed through an IP switch fabric or the circuit switch fabric, wherein the IP switch fabric is one kind of packet switched fabric.

24. The method of claim 23 further comprising the step of:

comparing a sustained packet ratio to a threshold value.

25. The switch of claim 9 wherein the controller is further configured to pass an IP traffic request to a destination node.

26. The switch of claim 9 wherein the controller is further configured to determine that all nodes along a proposed IP traffic path allocate circuit switch fabric resources for IP traffic.

27. The switch of claim 26 wherein the controller is further configured to establish an IP traffic path after determining that all nodes along a proposed IP traffic path allocate circuit switch fabric resources for IP traffic.

28. A hybrid telecommunications switch comprising:

at least one circuit switch fabric;

at least one packet switch fabric;

a controller configured to:

route IP traffic to the circuit switch fabric or packet switch fabric, depending on an ATM service category of the IP traffic;

allocate circuit switch fabric resources to traffic falling within an ATM service category; and

allocate available circuit switch resources, as indicated by a resource table, to received IP traffic requests.

29. The switch as in claim 28 wherein the controller is further configured to maintain circuit switch ingress and egress resource tables.

30. The switch as in claim 28 wherein the controller is further configured to pass an IP traffic request to a destination node and to establish an IP traffic path after having determined that all nodes along the proposed traffic path have accepted an IP traffic request.

31. The switch as in claim 30 wherein the controller is further configured to determine whether IP traffic associated with an rt-VBR ATM service category is to be routed through the circuit switch fabric.

32. The switch as in claim 31 wherein the controller is further configured to determine whether IP traffic associated with the rt-VBR ATM service category is to be routed through the circuit switch fabric based upon a peak to sustained packet rate ratio.

33. A method for routing telecommunications traffic in a hybrid telecommunications switch comprising at least one packet switch fabric, at least one circuit switch fabric, and a controller, including the step of:

routing IP traffic to the circuit switch fabric or packet switch fabric, depending on an ATM service category of the IP traffic;

provisioning a portion of the circuit switch fabric resources for circuit switched traffic;

allocating the remaining portion of the circuit switch fabric resources to IP traffic as a controller routes the IP traffic to the circuit switch fabric; and

allocating available circuit switch fabric resources, as indicated by a resource table, to IP traffic requests.

34. The method as in claim 33 further comprising the step of maintaining circuit switch ingress and egress resource tables.

35. The method as in claim 33 further comprising the step of passing an IP traffic request to a destination node.

36. The method as in claim 33 further comprising the step of determining that all nodes along the proposed IP traffic path have allocated circuit switch fabric resources for the IP traffic.

37. The method as in claim 36 further comprising the step of establishing an IP traffic path after the determination step.

38. The method as in claim 36 further comprising the step of determining whether IP traffic associated with an rt-VBR ATM service category is to be routed through an IP switch fabric or a circuit switch fabric.

39. The method as in claim 38 further comprising the step of comparing a sustained packet ratio to a threshold value.

40. The switch as in claim 30 wherein the controller is further configured to pass an IP traffic request to a destination node.

41. The switch as in claim 30 wherein the controller is further configured to determine that all nodes along a proposed IP traffic path allocate circuit switch fabric resources for IP traffic.

42. The switch as in claim 41 wherein the controller is further configured to establish an IP traffic path after determining that all nodes along a proposed IP traffic path allocate circuit switch fabric resources for IP traffic.

Appendix B

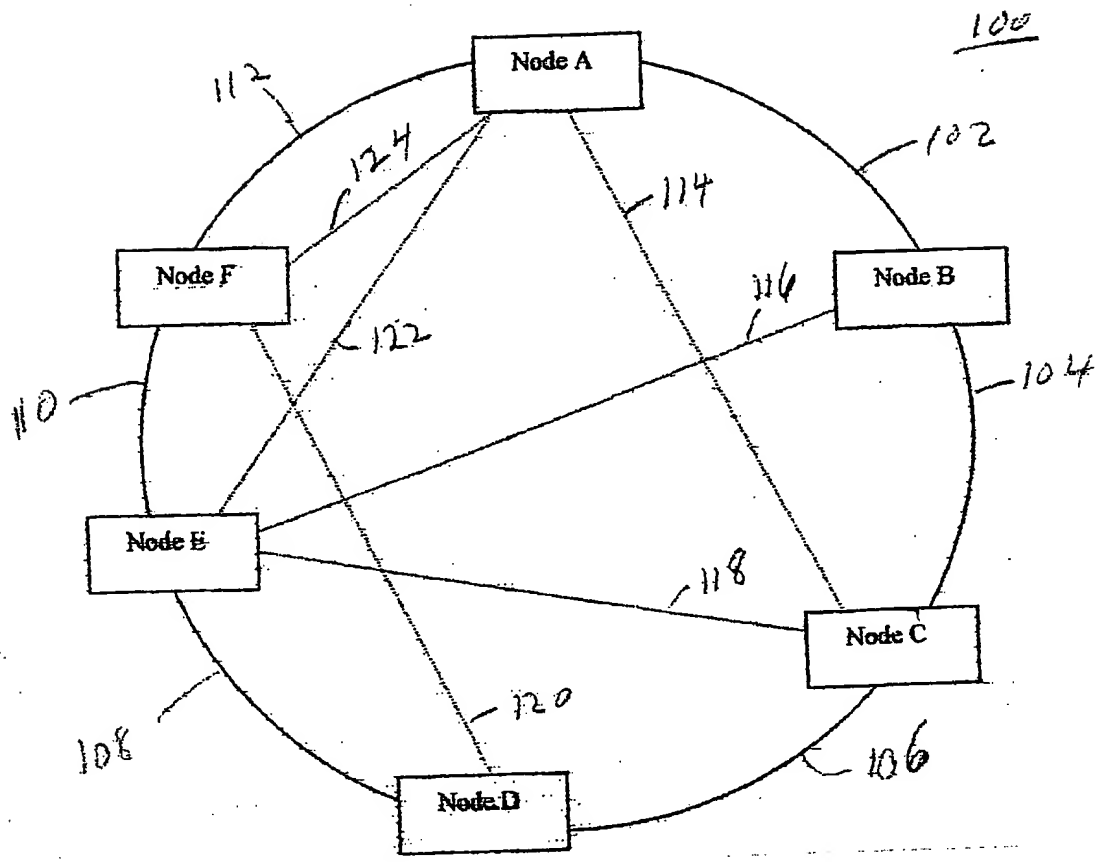

FIGURE 1

Appendix C

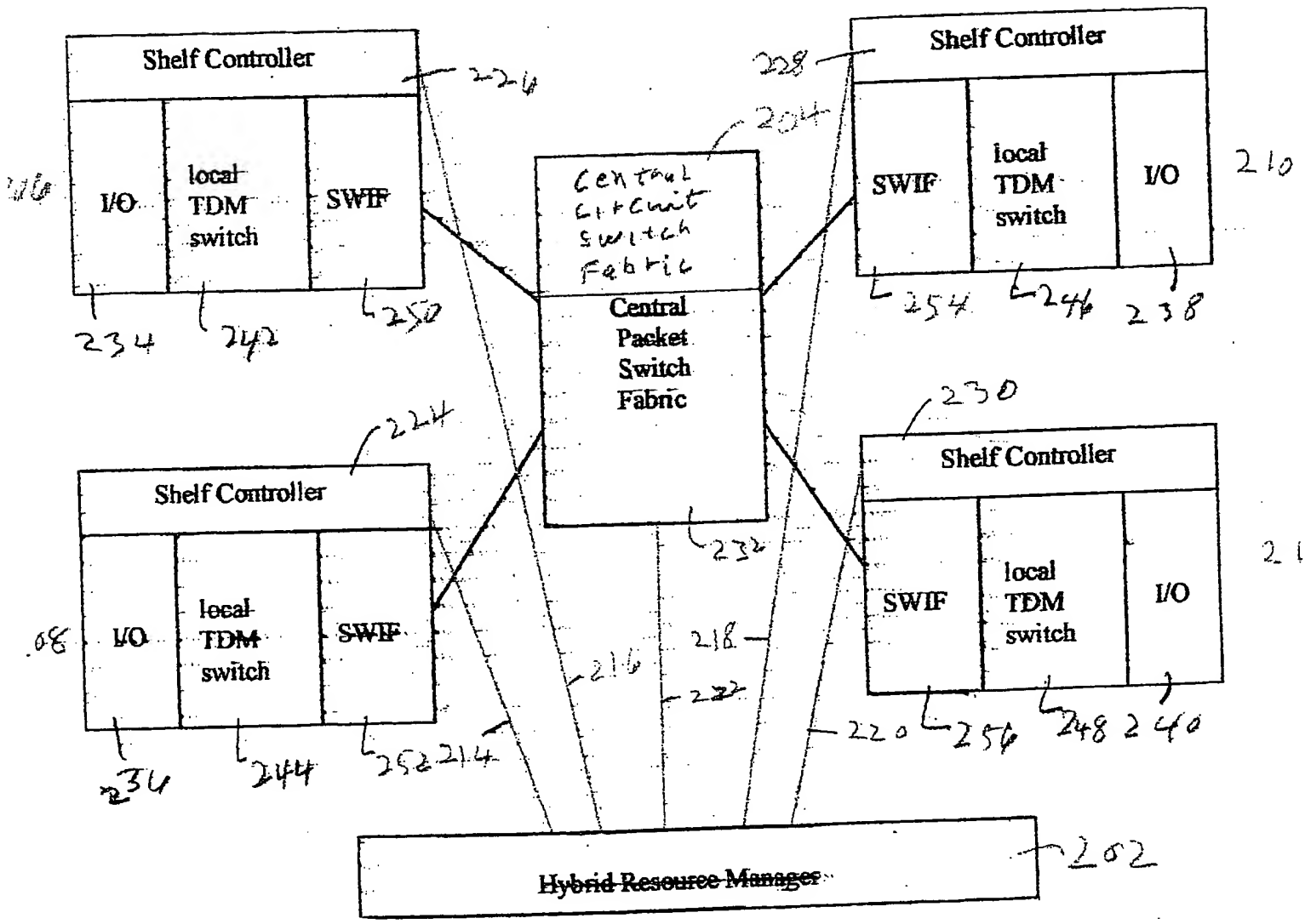

FIGURE 2

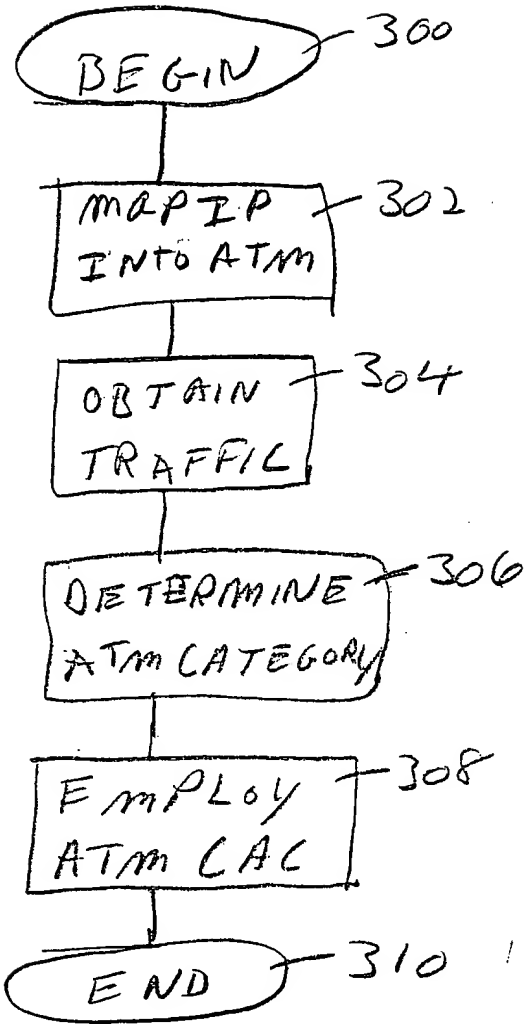
BEGIN
300
MAP IP INTO ATM
302
OBTAIN TRAFFIC
304
DETERMINE ATM CATEGORY
306
EMPLOY ATM CAC
308
END
310

FIGURE 3

Appendix E

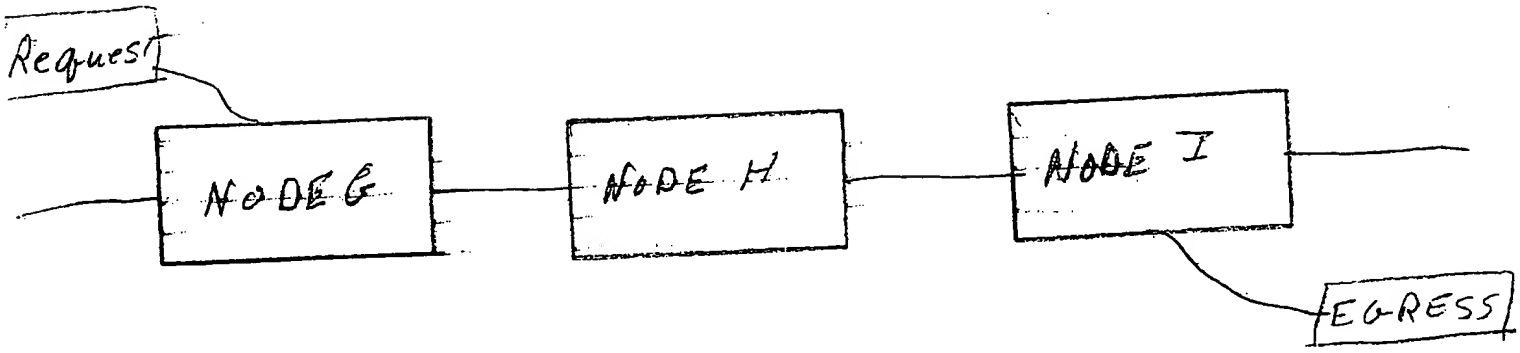

FIGURE 4

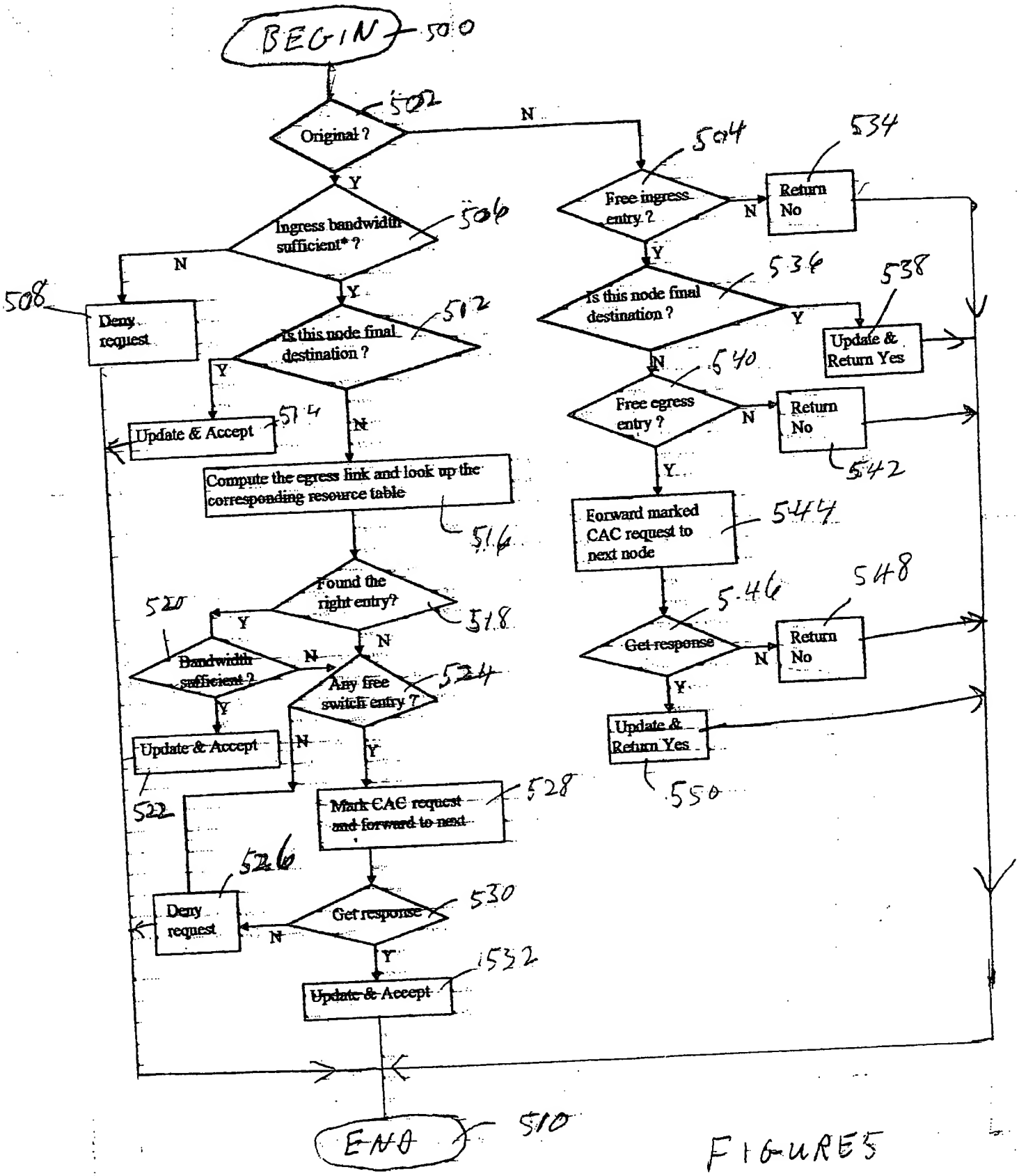
BEGIN
500
Original ?
502
N
Y
Ingress bandwidth sufficient* ?
506
N
Y
508
Deny request
Is this node final destination ?
512
Y
N
Update & Accept
514
Compute the egress link and look up the corresponding resource table
516
Found the right entry?
518
Y
N
520
Bandwidth sufficient ?
N
Y
Any free switch entry ?
524
Update & Accept
N
Y
522
Mark CAC request and forward to next
528
526
Deny request
Get response
530
N
Y
Update & Accept
1532
END
510
Free ingress entry ?
504
N
Return No
534
Y
Is this node final destination ?
536
Y
Update & Return Yes
538
N
Free egress entry ?
540
N
Return No
542
Y
Forward marked CAC request to next node
544
Get response
546
N
Return No
548
Y
Update & Return Yes
550

FIGURE 5

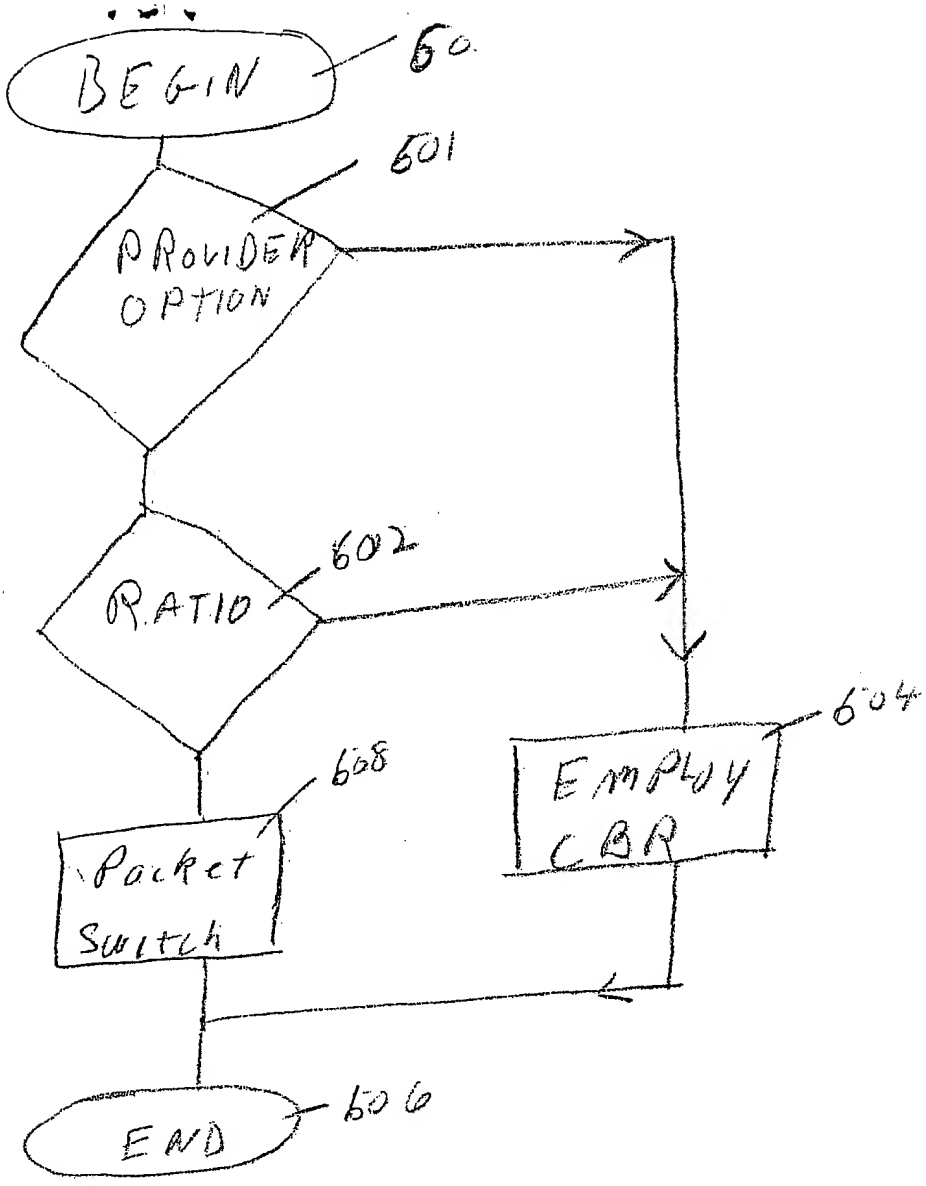
BEGIN
600
PROVIDER OPTION
601
RATIO
602
EMPLOY CBR
604
Packet Switch
608
END
606

FIGURE 6